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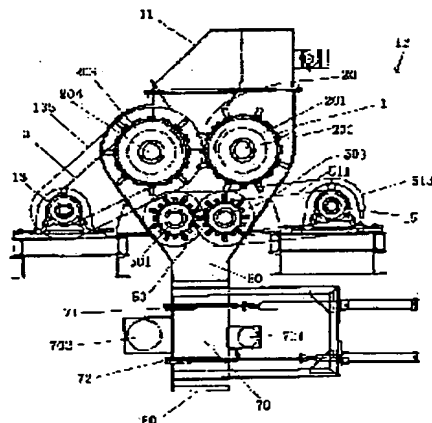
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(54) CRUSHING DEVICE FOR USED TONER CONTAINER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a crushing device which safely and efficiency crushes waste toner containers (cartridges) for copying machines without being accompanied by the toners sticking thereto, chips these containers to sizes meeting remolding and crushes the containers so as to be easily separated to plastic materials and metallic materials.

SOLUTION: This crushing device for the used toner containers is provided, in a housing 1, with an insertion port 11 for the used toner containers to be subjected to crushing treatment, a pair of roller-like coarse crushing means 20 which normally rotate in directions opposite to each other in a direction where the toner containers are bitten, a pair of roller-like secondary crushing means 50 which rotate the coarsely crushed pieces of the toner containers from the coarse crushing means in a direction where the toner containers are bitten, a powder removing means 70 (an air shower chamber) for removing the residual toners in the toner containers and/or the dust generated by the crushing from the inside of the housing and a crushed piece discharge port 80 which discharges the secondarily crushed pieces from the housing.



BEST AVAILABLE COPY

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the processing shredding equipment used for spallation of the toner waste cartridge for copying machines.

[0002]

[Description of the Prior Art] Although most used toner bottles are discarded without carrying out recycling use, the amount is huge and is increasing every year. Therefore, such industrial waste has social-problem-ized, and it does not decompose automatically, but establishment of the disposing method is hurried. Although it is desirable to lose an internal opening at least even though it was the case where reclamation disposal was allowed temporarily, although reclamation processing of most toner waste cartridges for copying machines was underground carried out as industrial waste now, even it is not made in the present condition. It is not suitable for not decomposing a used toner bottle automatically, but reclaiming land and disposing originally. Furthermore, although the raw material for most used toner bottles consisting of plastic material, therefore originally remolding for other products is obtained, for such a resources deployment, it is necessary to be crushed in the shape of [which can be fabricated] a chip.

[0003] Namely, although the toner cartridge for copying machines generally consists of a great portion of plastic material and a little metallic material and there is various the size, it is usually about 300x300x500mm at the maximum, and as for the used container of size which exceeds this, recovery and the recycle system with which it re-fills up are established in many cases by the toner maker. And into the cartridge which became unnecessary, **** abandonment of the residue of an intact toner is carried out often which built and adhered. On the other hand, the value as a substitute of the corks in a shaft furnace facility of iron-manufacture works etc. is being accepted as part of the deployment with a final waste plastic material. However, in order to reproduce the plastic material portion of the toner cartridge for waste copying machines as a corks substitute, an efficient head end process is required and this invention is made based on such a technical background.

[0004]

[Problem(s) to be Solved by the Invention] Therefore, the purpose of this invention is to offer the shredding equipment it is made to be easy to divide into plastic material and a metallic material while chip-izing it in the size which crushes safely and efficiently and balances a remolding, without being accompanied by the toner which has adhered the toner waste container for copying machines (cartridge) to them. Moreover, other purposes of this invention are to offer the shredding equipment of the used toner bottle as a head end process of recycling-izing of the toner cartridge for waste copying machines for lessening the portion which depends for the spallation work of a used toner bottle on a handicraft using a hand tool, reducing a labor burden, rationalizing the routing, and contributing to an improvement of working efficiency and a work environment.

[0005]

[Means for Solving the Problem] The above-mentioned purpose is attained by this invention. Namely, the insertion mouth of the used toner bottle in which spallation processing is carried out into (1) housing by this invention, Usually, a rough spallation means of the shape of one pair of roller to rotate this toner bottle of each other in the eating-away direction at an opposite direction, Secondary spallation meanses of the shape of one pair of roller to rotate the piece from this rough spallation means crushed [toner bottle rough] in the eating-away direction, Shredding equipment of the used toner bottle characterized by preparing the fine-particles removal means for removing the dust produced by the residual toner in the aforementioned toner bottle, and/or spallation from the inside of housing, and the spall exhaust port which makes the piece crushed [secondary] discharge from housing;

It has the train of the rough spallation pin by which the rough spallation means of the shape of the one aforementioned pair of roller was implanted in each periphery front face of each roller-like

member in the direction parallel to the axis of rotation two or more articles. (2) This rough spallation pin When a front face approaches [the roller-like member of both this] by the aforementioned rotation, Shredding equipment of a used toner bottle given in the ***** (1) term characterized by holding mutually physical relationship to which the rough spallation pin of the roller-like member front face of another side is located in the middle of the implantation gap (A) of the spallation pin of one roller-like member front face;

(3) Shredding equipment of a used toner bottle given in the ***** (1) term or ***** (2) term characterized by holding the gap (B) where the rough spallation means of the shape of the one aforementioned pair of roller passes the piece crushed [rough] between the crowning of the rough spallation pin of one roller-like member front face, and the roller-like member front face of another side;

(4) Shredding equipment of a used toner bottle given in the aforementioned ***** (3) term characterized by the ability of the aforementioned gap (B) to adjust freely when height control is free for the rough spallation pin of the roller-like member front face of the aforementioned rough spallation means;

It has the train of the secondary spallation pin by which secondary spallation meanses of the shape of the one aforementioned pair of roller were implanted in each periphery front face of each roller-like member in the direction parallel to the axis of rotation two or more articles. (5) This secondary spallation pin When a front face approaches [the roller-like member of both this] by the aforementioned rotation, Shredding equipment of a used toner bottle given in the ***** (1) term characterized by holding mutually physical relationship to which the secondary spallation pin of the roller-like member front face of another side is located in the middle of the implantation gap (C) of the secondary spallation pin of one roller-like member front face;

(6) Shredding equipment of a used toner bottle given in the ***** (2) term or ***** (5) term characterized by holding the gap (D) where secondary spallation meanses of the shape of the one aforementioned pair of roller pass the piece crushed [secondary] between the crowning of the secondary spallation pin of one roller-like member front face, and the roller-like member front face of another side;

(7) Shredding equipment of a used toner bottle given in the ***** (6) term characterized by the ability of the aforementioned gap (D) to adjust freely when height control is free for the secondary spallation pin of the roller-like member front face of the secondary aforementioned spallation meanses;

(8) The gap between rough spallation pins in the rough spallation pin train of the aforementioned rough spallation means (A) is 40-120mm. the ratio to the gap (A) between rough spallation pins in the rough spallation pin train of the aforementioned rough spallation means of the gap between secondary spallation pins in the secondary spallation pin train of the secondary aforementioned spallation meanses (C) -- A/C Shredding equipment of a used toner bottle given in the ***** (2) term or ***** (5) term characterized by being 1.5-3;

(9) The gap (B) which passes the piece between the crowning of the rough spallation pin of one roller-like member front face of the aforementioned rough spallation means and the roller-like member front face of another side crushed [rough] is 30-90mm. the ratio of this gap (B) and the gap (D) which passes the aforementioned piece of secondary spallation meanses crushed [secondary] -- shredding-equipment [of a used toner bottle given in the ***** (3) term or ***** (6) term to which B/D is characterized by being 1.5-3];

(10) The aforementioned train of the rough spallation pin implanted in the direction parallel to the axis of rotation of the front face of the roller-like member of a rough spallation means is established every 100-250mm on this roller-like member periphery. two -- order -- spallation -- a means -- a roller -- ** -- a member -- a front face -- the axis of rotation -- being parallel -- a direction -- implanting -- having had -- two -- order -- spallation -- a pin -- the above -- a train -- this -- a roller -- ** -- a member -- a periphery -- a top -- 40 -- -- 120 -- mm -- every -- preparing -- having -- **** -- things -- the feature -- ** -- carrying out -- ***** -- (-- two --) -- an

(11) It has two or more band-like reinforcement members by which each roller-like member of the aforementioned rough spallation means and secondary spallation meanses was fixed in the

direction parallel to the axis of rotation. this band-like reinforcement member -- spallation pin implantation -- many holes put on -- having -- this spallation pin implantation -- necessary [of the holes] -- to a hole Shredding equipment of a used toner bottle given in any 1 of the ***** (2) term characterized by screwing the aforementioned rough spallation pin and a secondary spallation pin through the spallation pin implantation member which has the height control member of a spallation pin, or the ***** (10) terms;

(12) Shredding equipment of a used toner bottle given in any 1 of the ***** (2) term to which the aforementioned spallation pin and a secondary spallation pin are characterized by being the bolt of JIS, or the ***** (11) terms;

(13) the above -- a roller -- ** -- a member -- JIS -- a cylinder -- inner skin -- plurality -- a disk -- ** -- a member -- fixing -- a roller -- ** -- a member -- the axis of rotation -- this -- a disk -- ** -- a member -- inside -- at least -- both -- a heel -- two -- a ** -- a roller -- ** -- a member -- the axis of rotation -- fixing -- having -- **** -- things -- the feature -- ** -- carrying out -- ***** -- (-- one - -)

(14) Shredding equipment of a used toner bottle with the aforementioned roller-like member given [the ends side of the cylinder of JIS] in any 1 of the ***** (1) term with flange material characterized by processing it, closing and fixing the axis of rotation of a roller-like member to the flange material of these ends at least, or the ***** (12) terms;

(15) the above -- rough -- spallation -- a means -- one -- a pair -- a roller -- ** -- a member -- rotation -- peripheral speed -- and -- the above -- two -- order -- spallation -- a means -- one -- a pair -- a roller -- ** -- a member -- rotation -- peripheral speed -- 0.1 -- -- 1.0 -- m/sec -- it is -- things -- the feature -- ** -- carrying out -- ***** -- (-- one --) -- a term -- or -- ***** -- (-- 14 --

(16) The aforementioned fine-particles removal means consists of an air shower booth prepared into the spall exhaust passage between the secondary aforementioned spallation meanses and the aforementioned spall exhaust port. The forced draft air duct which stands in a row in the blower for having the slide gate which this air shower booth can open and close freely in the upper part and the lower part of the aforementioned spall exhaust passage, and ventilating this air shower booth, Shredding equipment of a used toner bottle given in the ***** (1) term characterized by providing ***** which stands in a row in the fan for carrying out the suction exhaust air of the air from this air shower booth;

(17) the above -- an air shower booth -- air -- feeding and discarding -- it can set -- the above -- a blower -- a fan -- ventilation -- the force -- an assignment -- a blower -- 0.8 - one -- receiving -- a fan -- two - four -- it is -- things -- the feature -- ** -- carrying out -- ***** -- (-- 16 --) -- a term -- a publication -- used -- a toner bottle -- a shredding equipment -- therefore -- attaining -- making . [0006]

[Embodiments of the Invention] Hereafter, although the example of the shredding equipment of the used toner bottle of this invention is explained in detail based on a drawing, these drawings are for the essence of this invention being shown intelligibly, and are not for restricting this invention. The side elevation for drawing 1 explaining one example of the shredding equipment of the used toner bottle of this invention, drawing 2 -- the elevation surface cross section of the equipment of drawing 1 , and drawing 3 -- the -- a part -- a notch cross section and drawing 4 -- the flat-surface cross section of a rough spallation means -- Drawing where drawing 5 explains the flat-surface cross section of secondary spallation meanses, and drawing 6 explains the rough spallation pin implantation state of a rough spallation means, drawing where drawing 7 explains the secondary spallation pin implantation state of secondary spallation meanses, and drawing 8 are the perspective diagrams having shown the air shower booth in model.

[0007] One example of the shredding equipment of the used toner bottle shown in drawing 1 and drawing 2 The insertion mouth of the used toner bottle by which spallation processing is carried out at the crowning of housing (1) (11), Usually, a rough spallation means of the shape of one pair of roller to rotate a toner bottle in the eating-away direction (the right direction) (20), Secondary spallation meanses of the shape of one pair of roller to rotate the piece from a rough spallation means (20) crushed [toner bottle rough] in the eating-away direction (the right direction) (50), It has a fine-particles removal means for removing the dust produced by the residual toner in the

forementioned toner bottle, and/or spallation from the inside of housing, and the spall exhaust port (80) which makes the piece crushed [secondary] discharge from housing. A fine-particles removal means is established into spall exhaust passage (60). Moreover, an opposite direction can be made to rotate it when a rough spallation means (20) is [at the time of getting *****ed material blocked etc.] required of course.

[0008] In the shredding equipment of this example, although the used toner bottle by which housing (1) is carrying out the upright type and spallation processing is carried out is supplied to down from a top insertion mouth (11), in the shredding equipment of this invention, an insertion mouth (11) may be a thing with a hood which does not necessarily need to place [a thing] opening upside down, for example, is carrying out opening to the rough spallation means (20) upper part sideways. In this case, natural insertion can be carried out in difficulty, can be, and can prevent certainly splashes **** from the interior, such as a piece out of housing (1) of a thing crushed [rough]. However, even if there is no rotation peripheral velocity of one pair of rollers in the rough spallation means (20) of the shredding equipment of this example beginning to bound from the interior, such as a piece crushed [rough], since it is usually late enough, therefore it places opening of the insertion mouth (11) upside down like this example, there is no special trouble.

[0009] Housing (1) in the shredding equipment of this example has the hopper type spallation section (12) expanded to the upper part again, and has a rough spallation means (20) of the shape of one pair of roller to rotate the toner bottle of each other in the eating-away direction at opposite direction, in the upper part which has expanded the spallation section (12). As shown in drawing 4, this rough spallation means (20) gives the power from SM type prime mover (13) in which speed regulation is possible to the driver (132) of the major diameter which serves as torque conversion through a power means of communication (131) like an annular drive chain. Of course, it can replace with an annular drive chain and arbitrary torque conversion and power means of communication, such as other gearings and a V belt with a gear tooth, can be used. This gearing (133) engages with the gearing (134) with which another gearing (133) was fixed to the other end of the axis of rotation (202) of a roller-like member (201), and while the driver (132) is being fixed was fixed to the axis of rotation (204) of the roller-like member (203) of another side, and makes opposite direction rotate the roller (203) of this another side. It is desirable that it is 0.1 - 1.0 m/sec although the rotation peripheral speed of one pair of roller-like members of the rough spallation means of the shredding equipment of this invention and the rotation peripheral speed of one pair of roller-like members of the secondary aforementioned spallation means are not indispensable.

[0010] Under the insertion mouth (11) of a used toner bottle, as shown in drawing 5, secondary spallation means (50) of the shape of one pair of roller to rotate the piece from a rough spallation means (20) crushed [toner bottle rough] in the eating-away direction (the right direction) are arranged. This secondary spallation means (50) gives the power from SM type prime mover (15) in which speed regulation is possible to the driver (512) which serves as torque conversion through a power means of communication (511) like an annular drive chain, and the rotational-motion force from a driver (512) is transmitted to the roller-like member (503) of another side by the same engagement rolling mechanism as the case of a rough spallation means, and makes opposite direction rotate the roller (503) of this another side. moreover, each power means of communication (131) in this example of a shredding equipment -- and (511) -- **** -- the safety guard (135) which can be removed, respectively -- and (513) it is prepared

[0011] Two or more disk-like members (205) are fixed to the inner skin of the roller-like member (201) of a rough spallation means (20), and (203) the cylinder of JIS, and the axis of rotation (202) of a roller-like member is reinforced by [of these disk-like members (205)] fixing the axis of rotation (202) of a roller-like member (201) to two of both heels at least. instead, it is shown in drawing 3 -- as -- a roller-like member (201) -- and (203) Fixed processing of the ends effective area of the cylinder of JIS is carried out by the flange material (208) of the **** cone pressed fit so that it might close. a roller-like member (201) -- the axis of rotation (202) is being fixed to the flange material (208) of these ends for and (203) at least -- as -- nothing -- a bearing (209) can also be further prepared in the outside of both [these] flange material

[0012] The piece [finishing / spallation] of a toner bottle caudad discharged through secondary spallation means (50) is discharged by the fine-particles removal means which consists of an air shower booth (70) prepared into spall exhaust passage (60). An air shower booth (70) goes by spall exhaust passage (60). The up slide gate which can be freely opened and closed in a longitudinal direction (71), The forced draft air duct which stands in a row in the blower with which it is not illustrated for being divided by the lower slide gate (72) and ventilating an air shower booth (70) (701), After it has ***** (702) which stands in a row in the fan with which it is not illustrated for carrying out the suction exhaust air of the air from an air shower booth (70) and having been divided by the up slide gate (71) and the lower slide gate (72) ventilation through a forced draft air duct (701) and ***** (702) -- the crushed piece in an air shower booth (70) -- an air shower -- ***** -- the residual toner and dust which adhered to this in things can be removed from a crushed chip, can be made to be able to accompany to the air exhausted, and it can make outdoor discharge

[0013] As the outline is shown in drawing 1 and it is shown in drawing 6 in detail, it sets for the rough spallation means of this shredding equipment. Two or more welding fixation of the band-like reinforcement member (220) is carried out in the direction parallel to the axis of rotation on each periphery front face of one pair of roller-like members (201) (203). A hole (221) is punched. a band-like reinforcement member (220) -- rough spallation pin implantation of a seriate -- When a rough spallation pin screwing member (223) makes the male screw child of the outside surface screw in a hole (221), it is prepared in a seriate. this rough spallation pin implantation -- The rough spallation pin (222) is screwed in the female screw larval tunnel of the internal surface of a rough spallation pin screwing member (223) by the seriate, and the front face of a roller-like member (201) (203) **** the train of the rough spallation pin (222) screwed in this way, respectively eight times. moreover, the front face of a roller-like member (201) (203) -- rough spallation pin implantation -- although the hole (221) is punched, the rough spallation pin (222) is ****(ing) the band-like (therefore, rough spallation pin (222) can be extended) reinforcement member (220) which is not yet implanted eight times (drawing 1) That is, in the shredding equipment of this invention, the number of the trains of a rough spallation pin (222) can be suitably fluctuated by request. And when both roller-like members (201) (203) rotate and a front face approaches, each ***** pin (222) is implanted so that physical relationship to which the rough spallation pin (222) of the roller-like member (203) front face of another side is located in the middle of the implantation gap (A) of the rough spallation pin (222) of one roller-like member (201) front face may be held mutually (drawing 6).

[0014] Moreover, the rough spallation pin (222) is implanted so that the gap (B) which passes the piece crushed [rough] between the crowning of the rough spallation pin (222) of one roller-like member (201) front face and the roller-like member (203) front face of another side may be held. And after this gap (B) loosens a pin quantity fixed nut (224), by rotating the rough spallation pin (222) made to screw in the female screw larval tunnel of the internal surface of the above-mentioned rough spallation pin screwing member (223), it can adjust height, and after adjusting height, it can hold the height uniformly by fastening a pin quantity fixed nut (224). That is, in the shredding equipment of this invention, a gap (B) can be adjusted freely suitably, and it has the feature that it can respond to the size of the piece crushed [rough].

[0015] As the outline is shown in drawing 1 and it is shown in drawing 7 in detail, it sets for secondary spallation means of this shredding equipment. Two or more welding fixation of the band-like reinforcement member (520) is carried out in the direction parallel to the axis of rotation on each periphery front face of one pair of roller-like members (503) (501). A hole (521) is punched. a band-like reinforcement member (520) -- secondary spallation pin implantation of a seriate -- When a secondary spallation pin screwing member (523) makes the male screw child of the outside surface screw in a hole (521), it is prepared in a seriate. this secondary spallation pin implantation -- The secondary spallation pin (522) is screwed in the female screw larval tunnel of the internal surface of a secondary spallation pin screwing member (523) by the seriate, and the front face of a roller-like member (503) (501) **** the train of the secondary spallation pin (522) screwed in this way, respectively eight times. moreover, the front face of a roller-like member

(503) (501) -- secondary spallation pin implantation -- although the hole (521) is punched, the secondary spallation pin (522) is ****(ing) the band-like (therefore, secondary spallation pin (522) can be extended) reinforcement member (520) which is not yet implanted eight times (drawing 1) That is, in the shredding equipment of this invention, the number of the trains of a secondary spallation pin (522) can also be suitably fluctuated by request. And when both roller-like members (503) (501) rotate and a front face approaches, the each secondary spallation pin (522) is implanted so that physical relationship to which the secondary spallation pin (522) of the roller-like member (501) front face of another side is located in the middle of the implantation gap (C) of the secondary spallation pin (522) of one roller-like member (503) front face may be held mutually (drawing 7).

[0016] Moreover, the secondary spallation pin (522) is implanted so that the gap (D) which passes the piece crushed [secondary] between the crowning of the secondary spallation pin (522) of one roller-like member (503) front face and the roller-like member (501) front face of another side may be held. And after this gap (D) loosens a pin quantity fixed nut (524), by rotating the secondary spallation pin (522) made to screw in the female screw larval tunnel of the internal surface of the above-mentioned secondary spallation pin screwing member (523), it can adjust height, and after adjusting height, it can hold the height uniformly by fastening a pin quantity fixed nut (524). That is, in the shredding equipment of this invention, a gap (D) can be adjusted freely suitably, and it has the feature that it can respond to the size of the piece crushed [secondary].

[0017] The gap [in / the rough spallation pin (222) train of a rough spallation means (20) / generally / in the shredding equipment of this invention] between rough spallation pins (A) is 40-120mm (drawing 6), and the ratio to the gap (A) between rough spallation pins in the rough spallation pin train of the aforementioned rough spallation means (20) of the gap (C) between secondary spallation pins in the secondary spallation pin (522) train of secondary spallation meanses (50), and (drawing 7) -- it is more desirable that A/C is 1.5-3

[0018] Moreover, the gap (B) and (drawing 6) which pass the piece between the crowning of the rough spallation pin (222) of one roller-like member (201) front face of a rough spallation means (20) and the roller-like member (203) front face of another side crushed [rough] are 30-90mm. a ratio with this gap (B), the gap (D) which passes the aforementioned piece of secondary spallation meanses (50) crushed [secondary], and (drawing 7) -- generally it is desirable that B/Ds are 1.5-3

[0019] In the shredding equipment of this invention, moreover, the aforementioned train of the rough spallation pin (222) implanted in the direction parallel to the axis of rotation of the front face of the roller-like member (201) (203) of a rough spallation means (20) It is prepared every 100-250mm on this roller-like member (201) (203) periphery. The aforementioned train of the secondary spallation pin (522) implanted in the direction parallel to the axis of rotation of the front face of the roller-like member (503) (501) of secondary spallation meanses (50) is established every 40-120mm on this roller-like member (503) (501) periphery.

[0020] It has two or more band-like reinforcement members (220) by which each roller-like member (201) (203) of the aforementioned rough spallation means (20) was fixed in the direction parallel to the axis of rotation. this band-like reinforcement member (220) -- rough spallation pin implantation -- many holes (221) put on -- having -- this rough spallation pin implantation -- necessary [of the holes (221)] -- it is characterized by screwing the aforementioned rough spallation pin (222) in a hole through the rough spallation pin screwing member (223) which has the height control member of a spallation pin Similarly each roller-like member (503) (501) of the secondary aforementioned spallation meanses (50) It has two or more band-like reinforcement members (520) fixed in the direction parallel to the axis of rotation. Many holes (521) are put on. this band-like reinforcement member (520) -- secondary spallation pin implantation -- this secondary spallation pin implantation -- necessary [of the holes (521)] -- it is characterized by screwing the aforementioned secondary spallation pin (522) in a hole through the secondary spallation pin screwing member (523) which has the height control member of a spallation pin The aforementioned rough spallation pin (222) and a secondary spallation pin (522) are characterized by being the bolt of JIS.

[0021] In the shredding equipment of this example one pair of roller-like members (201) (203) of a rough spallation means (20) Two or more disk-like members (205) are fixed to the inner skin of the cylinder of JIS. the axis of rotation (202) (204) of a roller-like member (201) (203) -- the inside of this disk-like member (205) -- the axis of rotation (202) (204) of a roller-like member (201) (203) is fixed to two of both heels at least Similarly one pair of roller-like members (503) (501) of secondary spallation meanses (50) Two or more disk-like members (505) are fixed to the inner skin of the cylinder of JIS. the axis of rotation (504) (502) of a roller-like member (503) (501) -- the inside of this disk-like member (505) -- the axis of rotation (504) (502) of a roller-like member (503) (501) is fixed to two of both heels at least

[0022] Moreover, if the roller-like member (201) used for the rough shredding equipment of this invention should take up the ends side of the cylinder of JIS with flange attachment processing of flange material (208) and one example is given, it can do the basis by which the axis of rotation (202) of a roller-like member (201) should be fixed at least to the flange material (208) of these ends. The same is said of the case of other roller-like members.

[0023] As shown in drawing 8 and drawing 1 , the fine-particles removal means of the shredding equipment of this invention It consists of an air shower booth (70) prepared into the spall exhaust passage (60) between the secondary aforementioned spallation meanses (50) and the aforementioned spall exhaust port (80). in an air shower booth (70) It blows off in a push pull formula shower, i.e., little air, at high speed (push), and a lot of air is attracted (pull), and after removing so that a big and rough fragment etc. may not be carried in to the dust catcher which is not illustrated in a grid (707), uptake recovery of the residue toner is carried out with dust catchers, such as a bag filter. An air shower booth (70) possesses the forced draft air duct (701) which stands in a row in the blower (not shown) for having the up slide gate (71) and lower slide gate (72) which can be freely opened and closed in the upper part and the lower part, respectively, and ventilating this air shower booth (70) in the aforementioned spall exhaust passage (60), and ***** (702) which stands in a row in the fan (not shown) for carrying out the suction exhaust air of the air from this air shower booth (70).

[0024] Therefore, the forced draft air duct which stands in a row in a blower (not shown) (701), It is the space of the independent system which has the air blowing-in mouth (703) which equipped ***** (702) which stands in a row in the fan (not shown) for carrying out the suction exhaust air of the air from this air shower booth (70), and the air suction mouth (704) with which it was equipped with the grid (707). Have an up slide gate (71) to an up mouth (708), and it has a lower slide gate (72) to a lower mouth (709). When showering an air shower over the 2nd order thin spall which is crushed by the up spallation means and falls to an air shower booth (70), the slide gate of those both is closed. The air by which suction exhaust air is carried out from an air shower booth (70) collects detailed toners etc. with dust catchers, such as a bag filter which came out of the shredding equipment and was formed separately, after carrying out uptake processing of the big and rough suspension solid-state with a grid (707). The secondary spall by which the air shower was carried out has starting [little] the re entrainment of dust at a back process, more than the double precision of the amount of air blowing in of the amount of air suction in an air shower booth (70) is desirable, and its 3 or more times are the best. That is, it is desirable that the ventilation force assignments of the aforementioned blower and a fan in the air feeding and discarding to an air shower booth (70) are fans 2-4 to blowers 0.8-1. When the inner capacity of an air shower booth (70) is about 30-35l., ***** of 13 - 17m³/min, and an air suction mouth (704) has [3/min and that the blast weight of an air blowing-in mouth (703) is / ***** of 15m³/min, and an air suction mouth (704) / 3/min 45m] the blast weight of an air blowing-in mouth (703) preferably good [for example,] 40-55m.

[0025] Moreover, it cannot be overemphasized that the electrostatic preventive measure as a fundamental safety practice, such as equipping it with an electric discharge means as an important point or it surely takes a ground to the used toner cartridge shredding equipment of this invention, must be devised.

[0026] And it is desirable to set spallation processing of the used toner cartridge of this invention as peripheral-speed 0.1 m/sec of the roller (201) (203) of the rough spallation means (20) of a

shredding equipment, and to perform it in three cycles in 1 minute. Crush the toner cartridge for waste copying machines in three-piece 30 seconds in one-piece 10 seconds, an air shower booth (70) is made to fall, the deferred wind of a slide gate (71) and (72) is shut and carried out for 30 seconds, a toner etc. is separated, a slide gate (71) and (72) are opened, and debris is performed in eccentricity, spallation of collecting plastic material and a metallic material by type, a ventilation toner uptake, and the 1-minute cycle of eccentricity. In addition, according to the gestalt of the toner cartridge for waste copying machines, peripheral speed can be set up arbitrarily and a processing cycle can adjust it.

[0027]

[Effect of the Invention] as mentioned above, the shredding equipment of the used toner cartridge of this invention boils spallation efficiency markedly, raises it, and does so the outstanding effect of being safe and eco-friendly so that more clearly than detailed and concrete explanation Moreover, each spallation pin in a rough spallation means and secondary spallation meanses is easily exchangeable, and can change easily the implantation density and implantation height (namely, gap between the other party rollers which carry out opposite rotation), and it is said [can choose arbitrarily a drive and halt of both a rough spallation means and secondary spallation meanses, and can control rotational speed, driving force, and a hand of cut, and] that it reaches to an extreme of them, and excels in versatility.

[Translation done.]

CLAIMS

[Claim(s)]

[Claim 1] The shredding equipment of the used toner bottle characterized by providing the following. The insertion mouth of the used toner bottle by which spallation processing is carried out into housing. Usually, a rough spallation means of the shape of one pair of roller to rotate this toner bottle of each other in the eating-away direction at an opposite direction. Secondary spallation meanses of the shape of one pair of roller to rotate the piece from this rough spallation means crushed [toner bottle rough] in the eating-away direction. The fine-particles removal means for removing the dust produced by the residual toner in the aforementioned toner bottle, and/or spallation from the inside of housing, and the spall exhaust port which makes the piece crushed [secondary] discharge from housing.

[Claim 2] It has the train of the rough spallation pin by which the rough spallation means of the shape of the one aforementioned pair of roller was implanted in each periphery front face of each roller-like member in the direction parallel to the axis of rotation two or more articles. this rough spallation pin When a front face approaches [the roller-like member of both this] by the aforementioned rotation, The shredding equipment of the used toner bottle according to claim 1 characterized by holding mutually physical relationship to which the rough spallation pin of the roller-like member front face of another side is located in the middle of the implantation gap (A) of the spallation pin of one roller-like member front face.

[Claim 3] The shredding equipment of the used toner bottle according to claim 1 or 2 characterized by holding the gap (B) where the rough spallation means of the shape of the one aforementioned pair of roller passes the piece crushed [rough] between the crowning of the rough spallation pin of one roller-like member front face, and the roller-like member front face of another side.

[Claim 4] The shredding equipment of the used toner bottle according to claim 3 characterized by the ability of the aforementioned gap (B) to adjust freely when height control is free for the rough spallation pin of the roller-like member front face of the aforementioned rough spallation means.

[Claim 5] It has the train of the secondary spallation pin by which secondary spallation meanses of the shape of the one aforementioned pair of roller were implanted in each periphery front face of each roller-like member in the direction parallel to the axis of rotation two or more articles. this secondary spallation pin When a front face approaches [the roller-like member of both this] by the aforementioned rotation, The shredding equipment of the used toner bottle according to claim 1 characterized by holding mutually physical relationship to which the secondary spallation pin of the roller-like member front face of another side is located in the middle of the implantation gap (C) of the secondary spallation pin of one roller-like member front face.

[Claim 6] The shredding equipment of the used toner bottle according to claim 1 or 5 characterized by holding the gap (D) where secondary spallation meanses of the shape of the one aforementioned pair of roller pass the piece crushed [secondary] between the crowning of the secondary spallation pin of one roller-like member front face, and the roller-like member front face of another side.

[Claim 7] The shredding equipment of the used toner bottle according to claim 6 characterized by the ability of the aforementioned gap (D) to adjust freely when height control is free for the secondary spallation pin of the roller-like member front face of the secondary aforementioned spallation meanses.

[Claim 8] The gap between rough spallation pins in the rough spallation pin train of the aforementioned rough spallation means (A) is 40-120mm. the ratio to the gap (A) between rough spallation pins in the rough spallation pin train of the aforementioned rough spallation means of the gap between secondary spallation pins in the secondary spallation pin train of the secondary aforementioned spallation meanses (C) -- A/C The shredding equipment of the used toner bottle according to claim 2 or 5 characterized by being 1.5-3.

[Claim 9] The gap (B) which passes the piece between the crowning of the rough spallation pin of one roller-like member front face of the aforementioned rough spallation means and the roller-like member front face of another side crushed [rough] is 30-90mm. the ratio of this gap (B) and the

gap (D) which passes the aforementioned piece of secondary spallation meanses crushed [secondary] -- the shredding equipment of a used toner bottle according to claim 3 or 6 with which B/D is characterized by being 1.5-3

[Claim 10] The aforementioned train of the rough spallation pin implanted in the direction parallel to the axis of rotation of the front face of the roller-like member of a rough spallation means is established every 100-250mm on this roller-like member periphery. The shredding equipment of the used toner bottle according to claim 2 or 5 characterized by establishing the aforementioned train of the secondary spallation pin implanted in the direction parallel to the axis of rotation of the front face of the roller-like member of secondary spallation meanses every 40-120mm on this roller-like member periphery.

[Claim 11] It has two or more band-like reinforcement members by which each roller-like member of the aforementioned rough spallation means and secondary spallation meanses was fixed in the direction parallel to the axis of rotation. this band-like reinforcement member -- spallation pin implantation -- many holes put on -- having -- this spallation pin implantation -- necessary [of the holes] -- to a hole The shredding equipment of a used toner bottle given in any 1 of the claim 2 characterized by screwing the aforementioned rough spallation pin and a secondary spallation pin through the spallation pin implantation member which has the height control member of a spallation pin, or the claims 10.

[Claim 12] The shredding equipment of a used toner bottle given in any 1 of the claim 2 to which the aforementioned spallation pin and a secondary spallation pin are characterized by being the bolt of JIS, or the claims 11.

[Claim 13] The shredding equipment of a used toner bottle given in any 1 of the claim 1 to which the aforementioned roller-like member fixes two or more disk-like members to the inner skin of the cylinder of JIS, and the axis of rotation of a roller-like member is characterized by the thing of these disk-like members for which the axis of rotation of a roller-like member is being fixed to two of both heels at least, or the claims 12.

[Claim 14] The shredding equipment of a used toner bottle given in any 1 of the claim 1 characterized by for the aforementioned roller-like member processing the ends side of the cylinder of JIS with flange material, taking it up, and fixing the axis of rotation of a roller-like member to the flange material of these ends at least, or the claims 12.

[Claim 15] The shredding equipment of a used toner bottle given in any 1 of the claim 1 to which rotation peripheral speed of one pair of roller-like members of the aforementioned rough spallation means and rotation peripheral speed of one pair of roller-like members of the secondary aforementioned spallation meanses are characterized by being 0.1 - 1.0 m/sec, or the claims 14.

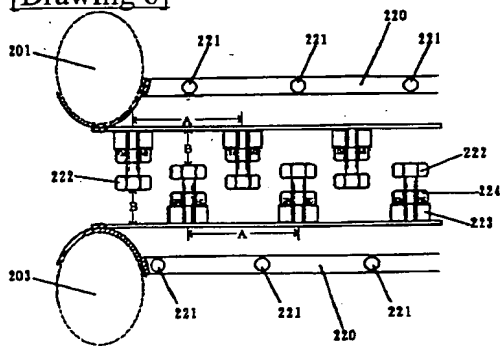
[Claim 16] The shredding equipment of the used toner bottle according to claim 1 characterized by providing the following. The forced draft air duct which stands in a row in the blower for the aforementioned fine-particles removal means consisting of an air shower booth prepared into the spall exhaust passage between the secondary aforementioned spallation meanses and the aforementioned spall exhaust port, and having the slide gate this air shower booth can open and close freely in the upper part and the lower part in the aforementioned spall exhaust passage, and ventilating this air shower booth. ***** which stands in a row in the fan for carrying out the suction exhaust air of the air from this air shower booth.

[Claim 17] The shredding equipment of a used toner bottle according to claim 16 with which the ventilation force assignment of the aforementioned blower and a fan in the air feeding and discarding to the aforementioned air shower booth is characterized by being fans 2-4 to blowers 0.8-1.

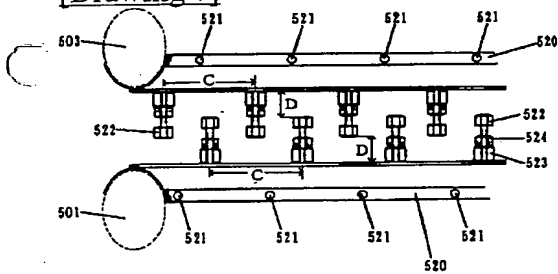
[Translation done.]

DRAWINGS

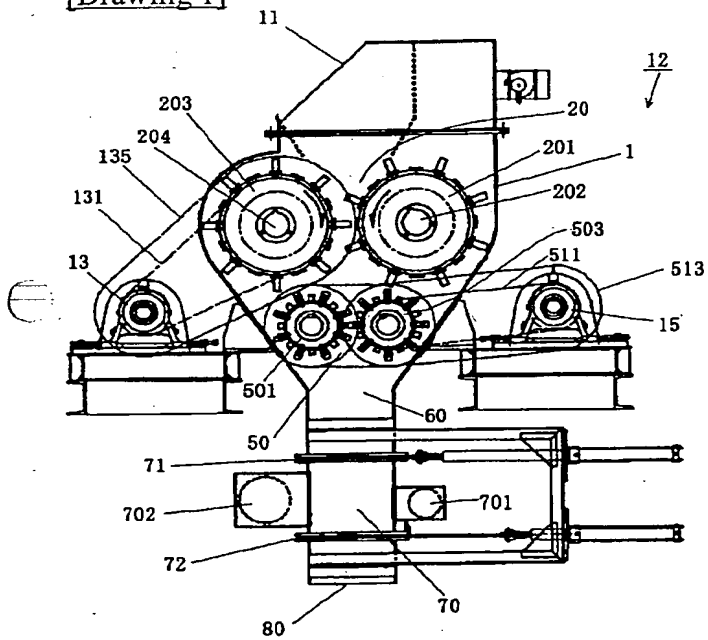
[Drawing 6]



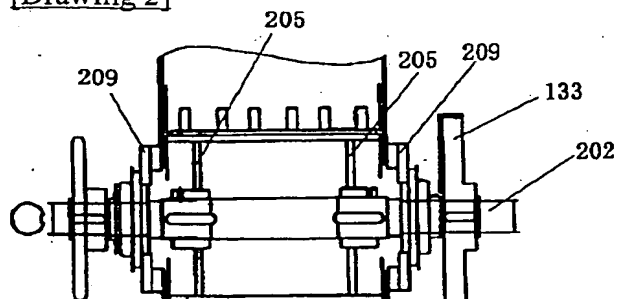
[Drawing 7]

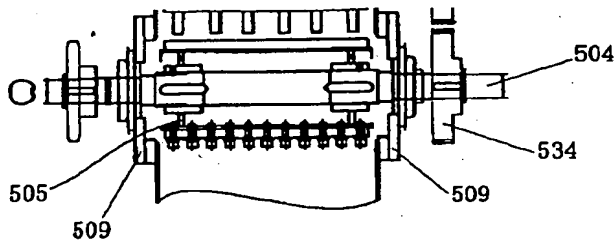


[Drawing 1]

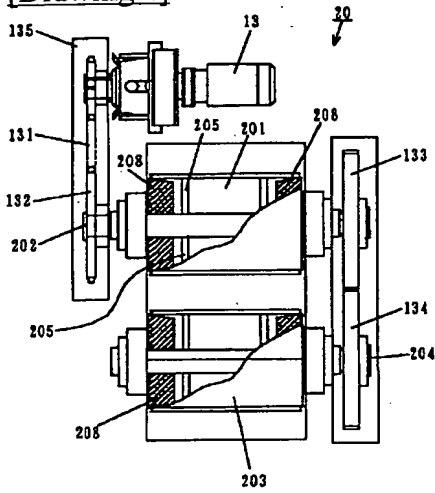


[Drawing 2]

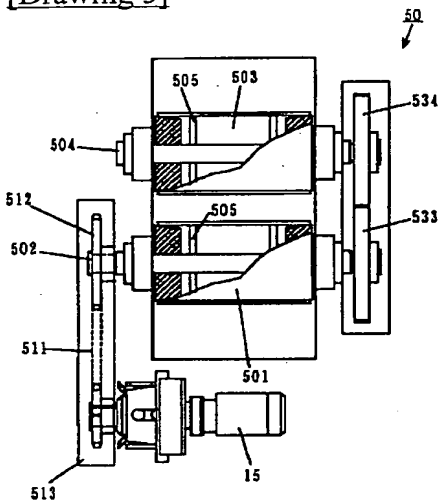




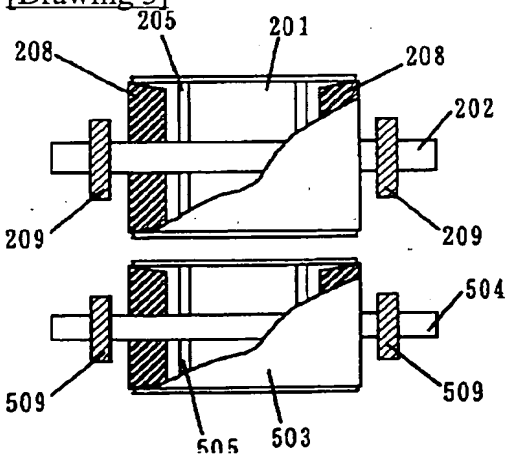
[Drawing 4]



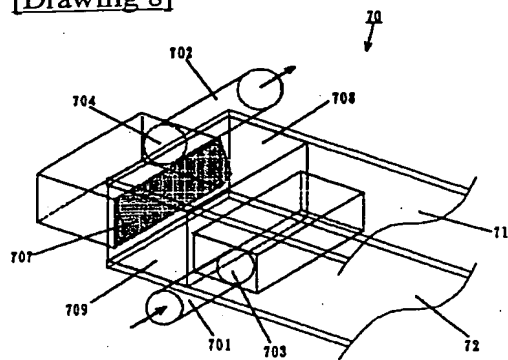
[Drawing 5]



[Drawing 3]



[Drawing 8]



[Translation done.]

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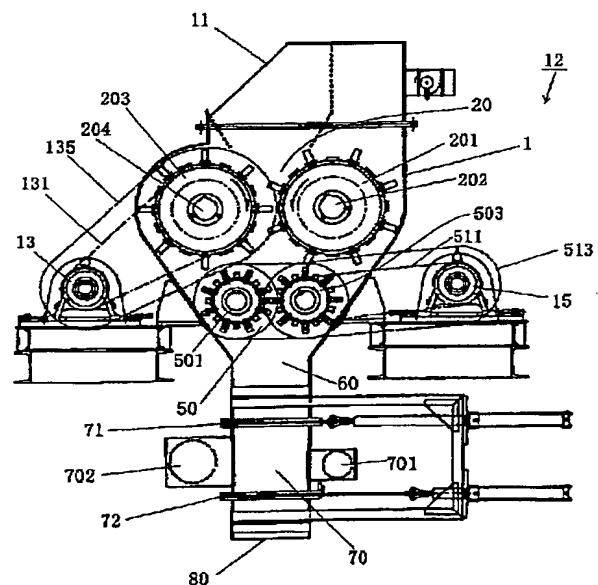
4D067 EE01 EE22 GA16 GA20 GB10

(54)【発明の名称】 使用済トナー容器の破碎装置

(57)【要約】 (修正有)

【課題】 複写機用トナー廃容器(カートリッジ)を、それらに付着しているトナーを伴うことなく、安全で効率よく破碎し、再成形に見合う大きさにチップ化すると共に、プラスチック材料と金属材料に分離し易いようにする破碎装置を提供する。

【解決手段】 ハウジング1内に、破碎処理される使用済トナー容器の挿入口11と、通常は該トナー容器を食い込む方向に互いに逆方向に回転する1対のローラ状の粗破碎手段20と、該粗破碎手段からのトナー容器粗破碎済片を食い込む方向に回転する1対のローラ状の2次破碎手段50と、前記トナー容器中の残存トナー及び/又は破碎により生じた粉塵をハウジング内から除去するための粉体除去手段70(エアシャワー室)と、2次破碎済片をハウジングから排出させる破碎片排出口80とを設けたことを特徴とする使用済トナー容器の破碎装置。



【特許請求の範囲】

【請求項1】 ハウジング内に、破碎処理される使用済トナー容器の挿入口と、通常は該トナー容器を食い込む方向に互いに逆方向に回転する1対のローラ状の粗破碎手段と、該粗破碎手段からのトナー容器粗破碎済片を食い込む方向に回転する1対のローラ状の2次破碎手段と、前記トナー容器中の残存トナー及び／又は破碎により生じた粉塵をハウジング内から除去するための粉体除去手段と、2次破碎済片をハウジングから排出させる破碎片排出口とを設けたことを特徴とする使用済トナー容器の破碎装置。

【請求項2】 前記1対のローラ状の粗破碎手段が、各ローラ状部材の円周表面それぞれに、回転軸に平行な方向に植設された粗破碎ピンの列を複数条有し、該粗破碎ピンは、該双方のローラ状部材が前記回転により表面が接近したとき、一方のローラ状部材表面の破碎ピンの植設間隙(A)の中間に他方のローラ状部材表面の粗破碎ピンが位置するような位置関係が互いに保持されることを特徴とする請求項1記載の使用済トナー容器の破碎装置。

【請求項3】 前記1対のローラ状の粗破碎手段が、一方のローラ状部材表面の粗破碎ピンの頂部と他方のローラ状部材表面との間に粗破碎済片を通過させる間隙(B)が保持されることを特徴とする請求項1又は請求項2に記載の使用済トナー容器の破碎装置。

【請求項4】 前記粗破碎手段のローラ状部材表面の粗破碎ピンが高さ調節自在なものであることにより、前記間隙(B)が調節自在であることを特徴とする請求項3に記載の使用済トナー容器の破碎装置。

【請求項5】 前記1対のローラ状の2次破碎手段が、各ローラ状部材の円周表面それぞれに、回転軸に平行な方向に植設された2次破碎ピンの列を複数条有し、該2次破碎ピンは、該双方のローラ状部材が前記回転により表面が接近したとき、一方のローラ状部材表面の2次破碎ピンの植設間隙(C)の中間に他方のローラ状部材表面の2次破碎ピンが位置するような位置関係が互いに保持されることを特徴とする請求項1記載の使用済トナー容器の破碎装置。

【請求項6】 前記1対のローラ状の2次破碎手段が、一方のローラ状部材表面の2次破碎ピンの頂部と他方のローラ状部材表面との間に2次破碎済片を通過させる間隙(D)が保持されることを特徴とする請求項1又は請求項5に記載の使用済トナー容器の破碎装置。

【請求項7】 前記2次破碎手段のローラ状部材表面の2次破碎ピンが高さ調節自在なものであることにより、前記間隙(D)が調節自在であることを特徴とする請求項6に記載の使用済トナー容器の破碎装置。

【請求項8】 前記粗破碎手段の粗破碎ピン列における粗破碎ピン相互間の間隙(A)が40～120mmであり、前記2次破碎手段の2次破碎ピン列における2次破

碎ピン相互間の間隙(C)の前記粗破碎手段の粗破碎ピン列における粗破碎ピン相互間の間隙(A)に対する比 A/C が、1.5～3であることを特徴とする請求項2又は請求項5に記載の使用済トナー容器の破碎装置。

【請求項9】 前記粗破碎手段の一方のローラ状部材表面の粗破碎ピンの頂部と他方のローラ状部材表面との間の粗破碎済片を通過させる間隙(B)が30～90mmであり、該間隙(B)と2次破碎手段の前記2次破碎済片を通過させる間隙(D)との比 B/D が、1.5～3であることを特徴とする請求項3又は請求項6に記載の使用済トナー容器の破碎装置。

【請求項10】 粗破碎手段のローラ状部材の表面の回転軸に平行な方向に植設された粗破碎ピンの前記列が該ローラ状部材円周上に100～250mm毎に設けられており、2次破碎手段のローラ状部材の表面の回転軸に平行な方向に植設された2次破碎ピンの前記列が該ローラ状部材円周上に40～120mm毎に設けられていることを特徴とする請求項2又は請求項5に記載の使用済トナー容器の破碎装置。

【請求項11】 前記粗破碎手段及び2次破碎手段の各ローラ状部材が、回転軸に平行な方向に固定された複数の帯状補強部材を有し、該帯状補強部材には破碎ピン植設孔が多数穿かれ、該破碎ピン植設孔のうちの所要孔に、前記粗破碎ピン及び2次破碎ピンが破碎ピンの高さ調節部材を有する破碎ピン植設部材を介して螺合されたことを特徴とする請求項2乃至請求項10のいずれか1に記載の使用済トナー容器の破碎装置。

【請求項12】 前記破碎ピン及び2次破碎ピンが、JIS規格のボルトであることを特徴とする請求項2乃至請求項11のいずれか1に記載の使用済トナー容器の破碎装置。

【請求項13】 前記ローラ状部材が、JIS規格の円筒の内周面に複数の円盤状部材を固定したものであり、ローラ状部材の回転軸が該円盤状部材のうちの少なくとも両末端部の2つにローラ状部材の回転軸が固定されていることを特徴とする請求項1乃至請求項12のいずれか1に記載の使用済トナー容器の破碎装置。

【請求項14】 前記ローラ状部材が、JIS規格の円筒の両端面をフランジ部材付加工して塞いだものであり、ローラ状部材の回転軸が少なくとも該両端のフランジ部材に固定されていることを特徴とする請求項1乃至請求項12のいずれか1に記載の使用済トナー容器の破碎装置。

【請求項15】 前記粗破碎手段の1対のローラ状部材の回転周速及び前記2次破碎手段の1対のローラ状部材の回転周速が、0.1～1.0m/secであることを特徴とする請求項1乃至請求項14のいずれか1に記載の使用済トナー容器の破碎装置。

【請求項16】 前記粉体除去手段が、前記2次破碎手段と前記破碎片排出口との間の破碎片排出路中に設けら

れたエアシャワー室からなり、該エアシャワー室が、前記破砕片排出路中で上部と下部に開閉自在のスライドゲートを有し、かつ、該エアシャワー室へ送風するための送風機に連なる送風路と、該エアシャワー室からエアを吸引排気するための排風機に連なる排風路とを具備することを特徴とする請求項1に記載の使用済トナー容器の破砕装置。

【請求項17】 前記エアシャワー室への空気給排における前記送風機と排風機の送風力分担が、送風機0.8～1に対し排風機2～4であることを特徴とする請求項16に記載の使用済トナー容器の破砕装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、複写機用トナー廃カートリッジの破砕に用いる処理破砕装置に関する。

【0002】

【従来の技術】使用済のトナー容器はほとんどリサイクル使用されことなく、廃棄されているが、その量は膨大でありかつ年々増加傾向にある。したがって、このような産業廃棄物が社会問題化しており、自然には腐敗せず、その処分法の確立が急がれている。現在、複写機用トナー廃カートリッジのほとんどは産業廃棄物として地下に埋め立て処理されているが、仮りに埋め立て処分が許される場合であったにしても少なくとも内部空隙をなくすることが好ましいのであるが現状ではそれさえもなされていない。元来、使用済のトナー容器は、自然には腐敗せず、埋め立て処分するには適していない。さらに、使用済のトナー容器はほとんどプラスチック材料からなり、したがって本来は他の製品に再成形するための原材料ともなり得るものであるが、そのような資源有効利用のためには、成形可能なチップ状に破砕されることが必要になる。

【0003】すなわち、複写機用トナーカートリッジは、一般的に、大部分のプラスチック材料と少量の金属材料からなり、その大きさは種々あるが普通は最大で300×300×500mm程度であり、これを超えるようなサイズの使用済容器はトナーメーカーにより、回収、再充填されるリサイクルシステムが確立されていることが多い。そして、不要になったカートリッジ内には、未使用のトナーの残渣が内蔵、付着したまま、廃棄される場合が多い。一方、廃プラスチック材料が最終的な有効利用の一環として製鉄工場の高炉設備等におけるコークスの代用品としての価値が認められつつある。しかしながら、廃複写機用トナーカートリッジのプラスチック材料部分をコークス代用品として再生させるためには、効率の良い前処理工程が必要であり、本発明はこのような技術的背景に基いてなされたものである。

【0004】

【発明が解決しようとする課題】したがって、本発明の目的は、複写機用トナー廃容器（カートリッジ）を、そ

れらに付着しているトナーを伴うことなく、安全で効率よく破砕し、再成形に見合う大きさにチップ化すると共に、プラスチック材料と金属材料に分離し易いようにする破砕装置を提供することにある。また、本発明の他の目的は、使用済トナー容器の破砕作業を、手工具を用いて手作業に頼る部分を少なくして労働負担を低減し、その作業工程を合理化して作業効率と作業環境の改善に寄与するための廃複写機用トナーカートリッジのリサイクルの前処理工程としての使用済トナー容器の破砕装置を提供することにある。

【0005】

【課題を解決するための手段】上記目的は、本発明により達成される。すなわち本発明により、

(1)ハウジング内に、破砕処理される使用済トナー容器の挿入口と、通常は該トナー容器を食い込む方向に互いに逆方向に回転する1対のローラ状の粗破砕手段と、該粗破砕手段からのトナー容器粗破砕済片を食い込む方向に回転する1対のローラ状の2次破砕手段と、前記トナー容器中の残存トナー及び／又は破砕により生じた粉塵をハウジング内から除去するための粉体除去手段と、2次破砕済片をハウジングから排出させる破砕片排出口とを設けたことを特徴とする使用済トナー容器の破砕装置；

(2)前記1対のローラ状の粗破砕手段が、各ローラ状部材の円周表面それぞれに、回転軸に平行な方向に植設された粗破砕ピンの列を複数条有し、該粗破砕ピンは、該双方のローラ状部材が前記回転により表面が接近したとき、一方のローラ状部材表面の破砕ピンの植設間隙

(A)の中間に他方のローラ状部材表面の粗破砕ピンが位置するような位置関係が互いに保持されることを特徴とする前記第(1)項に記載の使用済トナー容器の破砕装置；

(3)前記1対のローラ状の粗破砕手段が、一方のローラ状部材表面の粗破砕ピンの頂部と他方のローラ状部材表面との間に粗破砕済片を通過させる間隙(B)が保持されることを特徴とする前記第(1)項又は前記第

(2)項に記載の使用済トナー容器の破砕装置；

(4)前記粗破砕手段のローラ状部材表面の粗破砕ピンが高さ調節自在なものであることにより、前記間隙

(B)が調節自在であることを特徴とする前記前記第

(3)項に記載の使用済トナー容器の破砕装置；

(5)前記1対のローラ状の2次破砕手段が、各ローラ状部材の円周表面それぞれに、回転軸に平行な方向に植設された2次破砕ピンの列を複数条有し、該2次破砕ピンは、該双方のローラ状部材が前記回転により表面が接近したとき、一方のローラ状部材表面の2次破砕ピンの植設間隙(C)の中間に他方のローラ状部材表面の2次破砕ピンが位置するような位置関係が互いに保持されることを特徴とする前記第(1)項に記載の使用済トナー容器の破砕装置；

(6) 前記1対のローラ状の2次破碎手段が、一方のローラ状部材表面の2次破碎ピンの頂部と他方のローラ状部材表面との間に2次破碎済片を通過させる間隙(D)が保持されることを特徴とする前記第(2)項又は前記第(5)項に記載の使用済トナー容器の破碎装置；

(7) 前記2次破碎手段のローラ状部材表面の2次破碎ピンが高さ調節自在なものであることにより、前記間隙(D)が調節自在であることを特徴とする前記第(6)項に記載の使用済トナー容器の破碎装置；

(8) 前記粗破碎手段の粗破碎ピン列における粗破碎ピン相互間の間隙(A)が40～120mmであり、前記2次破碎手段の2次破碎ピン列における2次破碎ピン相互間の間隙(C)の前記粗破碎手段の粗破碎ピン列における粗破碎ピン相互間の間隙(A)に対する比 A/C が、1.5～3であることを特徴とする前記第(2)項又は前記第(5)項に記載の使用済トナー容器の破碎装置；

(9) 前記粗破碎手段の一方のローラ状部材表面の粗破碎ピンの頂部と他方のローラ状部材表面との間の粗破碎済片を通過させる間隙(B)が30～90mmであり、該間隙(B)と2次破碎手段の前記2次破碎済片を通過させる間隙(D)との比 B/D が、1.5～3であることを特徴とする前記第(3)項又は前記第(6)項に記載の使用済トナー容器の破碎装置；

(10) 粗破碎手段のローラ状部材の表面の回転軸に平行な方向に植設された粗破碎ピンの前記列が該ローラ状部材円周上に100～250mm毎に設けられており、2次破碎手段のローラ状部材の表面の回転軸に平行な方向に植設された2次破碎ピンの前記列が該ローラ状部材円周上に40～120mm毎に設けられていることを特徴とする前記第(2)項又は前記第(5)項に記載の使用済トナー容器の破碎装置；

(11) 前記粗破碎手段及び2次破碎手段の各ローラ状部材が、回転軸に平行な方向に固定された複数の帯状補強部材を有し、該帯状補強部材には破碎ピン植設孔が多数穿孔され、該破碎ピン植設孔のうちの所要孔に、前記粗破碎ピン及び2次破碎ピンが破碎ピンの高さ調節部材を有する破碎ピン植設部材を介して螺合されたことを特徴とする前記第(2)項乃至前記第(10)項のいずれか1に記載の使用済トナー容器の破碎装置；

(12) 前記破碎ピン及び2次破碎ピンが、JIS規格のボルトであることを特徴とする前記第(2)項乃至前記第(11)項のいずれか1に記載の使用済トナー容器の破碎装置；

(13) 前記ローラ状部材が、JIS規格の円筒の内周面に複数の円盤状部材を固定したものであり、ローラ状部材の回転軸が該円盤状部材のうちの少なくとも両外端部の2つにローラ状部材の回転軸が固定されていることを特徴とする前記第(1)項乃至前記第(12)項のいずれか1に記載の使用済トナー容器の破碎装置；

(14) 前記ローラ状部材が、JIS規格の円筒の両端面をフランジ部材付加工して塞いだものであり、ローラ状部材の回転軸が少なくとも該両端のフランジ部材に固定されていることを特徴とする前記第(1)項乃至前記第(12)項のいずれか1に記載の使用済トナー容器の破碎装置；

(15) 前記粗破碎手段の1対のローラ状部材の回転周速及び前記2次破碎手段の1対のローラ状部材の回転周速が、0.1～1.0m/secであることを特徴とする前記第(1)項乃至前記第(14)項のいずれか1に記載の使用済トナー容器の破碎装置；

(16) 前記粉体除去手段が、前記2次破碎手段と前記破碎片排出口との間の破碎片排出路中に設けられたエアシャワー室からなり、該エアシャワー室が、前記破碎片排出路の上部と下部に開閉自在のスライドゲートを有し、かつ、該エアシャワー室へ送風するための送風機に連なる送風路と、該エアシャワー室からエアを吸引排気するための排風機に連なる排風路とを具備することを特徴とする前記第(1)項に記載の使用済トナー容器の破碎装置；

(17) 前記エアシャワー室への空気給排における前記送風機と排風機の送風力分担が、送風機0.8～1に対し排風機2～4であることを特徴とする前記第(16)項に記載の使用済トナー容器の破碎装置、によって達成させる。

【0006】

【発明の実施の形態】以下、本発明の使用済トナー容器の破碎装置の例を図面に基いて詳細に説明するが、これら図面は本発明の本質を判り易く示すためのものであって、本発明を制限するためのものではない。図1は本発明の使用済トナー容器の破碎装置の1例を説明するための側面図、図2は図1の装置の立面断面図、図3はその一部切欠き断面図、図4は粗破碎手段の平面断面図、図5は2次破碎手段の平面断面図、図6は粗破碎手段の粗破碎ピン植設状態を説明する図、図7は2次破碎手段の2次破碎ピン植設状態を説明する図、図8はエアシャワー室を模式的に示した斜視図である。

【0007】図1及び図2に示される使用済トナー容器の破碎装置の1例は、ハウジング(1)の頂部に、破碎処理される使用済トナー容器の挿入口(11)と、通常はトナー容器を食い込む方向(正方向)に回転する1対のローラ状の粗破碎手段(20)と、粗破碎手段(20)からのトナー容器粗破碎済片を食い込む方向(正方向)に回転する1対のローラ状の2次破碎手段(50)と、前記トナー容器中の残存トナー及び/又は破碎により生じた粉塵をハウジング内から除去するための粉体除去手段と、2次破碎済片をハウジングから排出させる破碎片排出口(80)とを有する。粉体除去手段は破碎片排出路(60)中に設けられる。また、粗破碎手段(20)は、無論、被粗破碎材料が詰まった場合等の必要な

ときには逆方向に回転させることができる。

【0008】この例の破碎装置においては、ハウジング(1)はアップライト型をしており、破碎処理される使用済トナー容器は、頂部の挿入口(11)から下方方向に投入されるが、本発明の破碎装置において、挿入口(11)は、必ずしも下向きに開口している必要はなく、例えば、粗破碎手段(20)上部に横向きに開口しているフード付きのものであってもよい。その場合は自然挿入は難しいものの、ハウジング(1)内からの粗破碎済片等の内部からの跳ね出しを確実に防止することができる。しかしながら、この例の破碎装置の粗破碎手段(20)における1対のローラの回転周速度は通常、充分遅いので粗破碎済片等の内部からの跳ね出しはなく、したがって、この例のように挿入口(11)を下向きに開口させても別段の支障はない。

【0009】この例の破碎装置におけるハウジング(1)はまた、上部に拡大したホッパー型の破碎部(12)を有し、破碎部(12)の拡大している上部には、トナー容器を食い込む方向に互いに反対方向に回転する1対のローラ状の粗破碎手段(20)を有する。図4に示されるように、この粗破碎手段(20)は速度調節可能なSM型原動機(13)からの動力を、例えば環状の駆動チェーンのような動力伝達手段(131)を介してトルク変換を兼ねる大径の駆動歯車(132)に与える。無論、環状の駆動チェーンに代えて他の例えば歯車、歯付Vベルト等任意のトルク変換及び動力伝達手段を用いることができる。駆動歯車(132)が固定されている一方のローラ状部材(201)の回転軸(202)の他端には、別の歯車(133)が固定され、この歯車(133)は、他方のローラ状部材(203)の回転軸(204)に固定された歯車(134)と歯合して、該他方のローラ(203)を反対方向に回転させる。本発明の破碎装置の粗破碎手段の1対のローラ状部材の回転周速及び前記2次破碎手段の1対のローラ状部材の回転周速は、 $0.1 \sim 1.0 \text{ m/sec}$ であることが、必要不可欠ではないが好ましい。

【0010】使用済トナー容器の挿入口(11)の下方には、図5に示されるように、粗破碎手段(20)からのトナー容器粗破碎済片を食い込む方向(正方向)に回転する1対のローラ状の2次破碎手段(50)が配置されている。この2次破碎手段(50)は速度調節可能なSM型原動機(15)からの動力を、例えば環状の駆動チェーンのような動力伝達手段(511)を介してトルク変換を兼ねる駆動歯車(512)に与え、駆動歯車(512)からの回転動力は、粗破碎手段の場合と同様な歯合回転機構により他方のローラ状部材(503)に伝達され該他方のローラ(503)を反対方向に回転させる。また、この破碎装置例におけるそれぞれの動力伝達手段(131)及び(511)には、それぞれ、取外しできる安全カバー(135)及び(513)が設けら

れている。

【0011】粗破碎手段(20)のローラ状部材(201)及び(203)は、JIS規格の円筒の内周面に複数の円盤状部材(205)を固定したものであり、ローラ状部材の回転軸(202)が該円盤状部材(205)のうちの少なくとも両外端部の2つにローラ状部材(201)の回転軸(202)が固定されることにより、補強されている。代わりに、図3に示されるように、ローラ状部材(201)及び(203)は、JIS規格の円筒の両端開口面を、塞ぐように圧入した裁頭円錐形のフランジ部材(208)で固定加工し、ローラ状部材(201)及び(203)の回転軸(202)が少なくとも該両端のフランジ部材(208)に固定されているようになり、さらに、それら両フランジ部材の外側に軸受け(209)を設けることもできる。

【0012】2次破碎手段(50)を経て下方に排出された破碎済のトナー容器片は、破碎片排出路(60)中に設けられたエアージャワー室(70)からなる粉体除去手段に排出される。エアージャワー室(70)は、破碎片排出路(60)をよぎって横方向に開閉自在な上部スライドゲート(71)と、下部スライドゲート(72)とにより仕切られ、エアージャワー室(70)へ送風するための図示されてない送風機に連なる送風路(701)と、エアージャワー室(70)からエアーを吸引排気するための図示されてない排風機に連なる排風路(702)とを有し、上部スライドゲート(71)及び下部スライドゲート(72)により仕切られた状態で、送風路(701)及び排風路(702)を介した通風によりエアージャワー室(70)内の破碎済片をエアージャワーに暴らすことでこれに付着した残存トナー及び粉塵を破碎済チップから除去し、排気されるエアーに随伴させて室外に排出させることができる。

【0013】図1にその概要が示され、図6に詳細に示されるように、この破碎装置の粗破碎手段においては、1対のローラ状部材(201)(203)のそれぞれの円周表面に回転軸に平行な方向に帯状補強部材(220)が複数溶接固定され、帯状補強部材(220)には列状の粗破碎ピン植設孔(221)が穿孔され、この粗破碎ピン植設孔(221)には粗破碎ピン螺合部材(223)がその外表面の雄螺子を螺合させることにより列状に設けられ、粗破碎ピン螺合部材(223)の内表面の雄螺子孔には粗破碎ピン(222)が列状に螺合されており、ローラ状部材(201)(203)の表面は、それぞれ、このように螺合された粗破碎ピン(222)の列を8列有する。またローラ状部材(201)(203)の表面は、粗破碎ピン植設孔(221)が穿孔されているが粗破碎ピン(222)が未だ植設されていない(したがって粗破碎ピン(222)を増設することができる)帯状補強部材(220)を8列有している(図1)。つまり、本発明の破碎装置においては、粗破碎ピ

ン(222)の列の数は、所望により適宜増減することができる。そして、各粗破砕ピン(222)は、双方のローラ状部材(201)(203)が回転して表面が接近したとき、一方のローラ状部材(201)表面の粗破砕ピン(222)の植設間隙(A)の中間に他方のローラ状部材(203)表面の粗破砕ピン(222)が位置するような位置関係が互いに保持されるように植設されている(図6)。

【0014】また、粗破砕ピン(222)は、一方のローラ状部材(201)表面の粗破砕ピン(222)の頂部と他方のローラ状部材(203)表面との間に粗破砕済片を通過させる間隙(B)が保持されるように植設されている。そしてこの間隙(B)は、ピン高固定ナット(224)を緩めた後に上記粗破砕ピン螺合部材(223)の内表面の雌螺子孔内に螺合させた粗破砕ピン(222)を回転させることにより高さを調節することができ、高さを調節後はピン高固定ナット(224)を締めることによりその高さを一定に保持することができる。つまり、本発明の破砕装置においては間隙(B)は適宜調節自在であり、粗破砕済片の大きさに対応できるという特徴を有している。

【0015】図1にその概要が示され、図7に詳細に示されるように、この破砕装置の2次破砕手段においては、1対のローラ状部材(503)(501)のそれぞれの円周表面に回転軸に平行な方向に帯状補強部材(520)が複数溶接固定され、帯状補強部材(520)には列状の2次破砕ピン植設孔(521)が穿孔され、この2次破砕ピン植設孔(521)には2次破砕ピン螺合部材(523)がその外表面の雄螺子を螺合させることにより列状に設けられ、2次破砕ピン螺合部材(523)の内表面の雌螺子孔には2次破砕ピン(522)が列状に螺合されており、ローラ状部材(503)(501)の表面は、それぞれ、このように螺合された2次破砕ピン(522)の列を8列有する。またローラ状部材(503)(501)の表面は、2次破砕ピン植設孔(521)が穿孔されているが2次破砕ピン(522)が未だ植設されてない(したがって2次破砕ピン(522)を増設することができる)帯状補強部材(520)を8列有している(図1)。つまり、本発明の破砕装置においては、2次破砕ピン(522)の列の数も、所望により適宜増減することができる。そして、各2次破砕ピン(522)は、双方のローラ状部材(503)(501)が回転して表面が接近したとき、一方のローラ状部材(503)表面の2次破砕ピン(522)の植設間隙(C)の中間に他方のローラ状部材(501)表面の2次破砕ピン(522)が位置するような位置関係が互いに保持されるように植設されている(図7)。

【0016】また、2次破砕ピン(522)は、一方のローラ状部材(503)表面の2次破砕ピン(522)の頂部と他方のローラ状部材(501)表面との間に2

次破砕済片を通過させる間隙(D)が保持されるように植設されている。そしてこの間隙(D)は、ピン高固定ナット(524)を緩めた後に上記2次破砕ピン螺合部材(523)の内表面の雌螺子孔内に螺合させた2次破砕ピン(522)を回転させることにより高さを調節することができ、高さを調節後はピン高固定ナット(524)を締めることによりその高さを一定に保持することができる。つまり、本発明の破砕装置においては間隙(D)は適宜調節自在であり、2次破砕済片の大きさに対応できるという特徴を有している。

【0017】本発明の破砕装置は、一般的に粗破砕手段(20)の粗破砕ピン(222)列における粗破砕ピン相互間の間隙(A)が40~120mm(図6)であること、及び、2次破砕手段(50)の2次破砕ピン(522)列における2次破砕ピン相互間の間隙(C)(図7)の前記粗破砕手段(20)の粗破砕ピン列における粗破砕ピン相互間の間隙(A)に対する比 A/C が、1.5~3であることがより好ましい。

【0018】また、粗破砕手段(20)の一方のローラ状部材(201)表面の粗破砕ピン(222)の頂部と他方のローラ状部材(203)表面との間の粗破砕済片を通過させる間隙(B)(図6)が30~90mmであり、この間隙(B)と2次破砕手段(50)の前記2次破砕済片を通過させる間隙(D)(図7)との比 B/D が、1.5~3であることが一般的に好ましい。

【0019】また、本発明の破砕装置においては、粗破砕手段(20)のローラ状部材(201)(203)の表面の回転軸に平行な方向に植設された粗破砕ピン(222)の前記列は、該ローラ状部材(201)(203)円周上に100~250mm毎に設けられ、2次破砕手段(50)のローラ状部材(503)(501)の表面の回転軸に平行な方向に植設された2次破砕ピン(522)の前記列は、該ローラ状部材(503)(501)円周上に40~120mm毎に設けられる。

【0020】前記粗破砕手段(20)の各ローラ状部材(201)(203)が回転軸に平行な方向に固定された複数の帯状補強部材(220)を有し、該帯状補強部材(220)には粗破砕ピン植設孔(221)が多数穿孔され、該粗破砕ピン植設孔(221)のうちの所要孔に、前記粗破砕ピン(222)が破砕ピンの高さ調節部材を有する粗破砕ピン螺合部材(223)を介して螺合されたことを特徴とする。同様に、前記2次破砕手段(50)の各ローラ状部材(503)(501)が、回転軸に平行な方向に固定された複数の帯状補強部材(520)を有し、該帯状補強部材(520)には2次破砕ピン植設孔(521)が多数穿孔され、該2次破砕ピン植設孔(521)のうちの所要孔に、前記2次破砕ピン(522)が破砕ピンの高さ調節部材を有する2次破砕ピン螺合部材(523)を介して螺合されたことを特徴とする。前記粗破砕ピン(222)及び2次破砕ピン

(522)が、JIS規格のボルトであることを特徴とする。

【0021】この例の破碎装置において、粗破碎手段(20)の1対のローラ状部材(201)(203)は、JIS規格の円筒の内周面に複数の円盤状部材(205)を固定したものであり、ローラ状部材(201)(203)の回転軸(202)(204)が該円盤状部材(205)のうちの少なくとも両外端部の2つにローラ状部材(201)(203)の回転軸(202)(204)が固定されたものである。同様に、2次破碎手段(50)の1対のローラ状部材(503)(501)は、JIS規格の円筒の内周面に複数の円盤状部材(505)を固定したものであり、ローラ状部材(503)(501)の回転軸(504)(502)が該円盤状部材(505)のうちの少なくとも両外端部の2つにローラ状部材(503)(501)の回転軸(504)(502)が固定されたものである。

【0022】また本発明の粗破碎装置に用いられたローラ状部材(201)は、JIS規格の円筒の両端面をフランジ部材(208)のフランジ付け加工により塞いだものとすることができ、1例を挙げると、ローラ状部材(201)の回転軸(202)が少なくとも該両端のフランジ部材(208)に固定されたものとするもができる。他のローラ状部材の場合も同様である。

【0023】図8、図1に示されるように、本発明の破碎装置の粉体除去手段は、前記2次破碎手段(50)と前記破碎片排出口(80)との間の破碎片排出路(60)中に設けられたエアシャワー室(70)からなり、エアシャワー室(70)では、プッシュプル式シャワー、つまり、少量の空気を高速で吹き出し(プッシュ)、多量の空気を吸引(プル)して、格子(707)により図示していない集塵機に粗大破片等を搬入しないように除去した後、バグフィルター等の集塵機で残渣トナーを捕集回収する。エアシャワー室(70)は、前記破碎片排出路(60)中で、上部と下部に、それぞれ開閉自在の上部スライドゲート(71)と下部スライドゲート(72)を有し、かつ、該エアシャワー室(70)へ送風するための送風機(図示せず)に連なる送風路(701)と、該エアシャワー室(70)からエアを吸引排気するための排風機(図示せず)に連なる排風路(702)とを具備する。

【0024】したがって、送風機(図示せず)に連なる送風路(701)と、該エアシャワー室(70)からエアを吸引排気するための排風機(図示せず)に連なる排風路(702)とを装備した空気吹込口(703)と格子(707)が装着された空気吸引口(704)を有する独立系の空間であり、上部口(708)に上部スライドゲート(71)を、下部口(709)に下部スライドゲート(72)を有し、上部破碎手段によって破碎されてエアシャワー室(70)に落下する2次細破

片にエアシャワーを浴びせるときはそれらの両方のスライドゲートは閉じられ、エアシャワー室(70)から吸引排気される空気は格子(707)で粗大浮遊固体を捕集処理した後破碎装置を出て別途設けたバグフィルター等の集塵機で微細なトナー等を回収する。エアシャワーされた2次破碎片は、後工程で粉塵の再飛散を起こすことが少なく、エアシャワー室(70)内の空気吸引量は、空気吹込量の2倍以上が望ましく、3倍以上が最もよい。つまりエアシャワー室(70)への空気給排における前記送風機と排風機の送風力分担が、送風機0.8~1に対し排風機2~4であることが好ましい。例えばエアシャワー室(70)の内容量が約30~35リットルのとき空気吹込口(703)の送風量が13~17m³/min、空気吸引口(704)の排風量が40~55m³/min、好ましくは、空気吹込口(703)の送風量が15m³/min、空気吸引口(704)の排風量が45m³/minであることがよい。

【0025】また、重要な点として、本発明の使用済トナーカートリッジ破碎装置には、必ずアースを取る或いは除電手段を装着する等、基本的な安全対策としての静電防止策を講じなければならないことはいうまでもない。

【0026】そして、本発明の使用済トナーカートリッジの破碎処理は、破碎装置の粗破碎手段(20)のローラ(201)(203)の周速0.1m/secに設定して1分間に3個のサイクルで行なうのが好ましい。廃複写機用トナーカートリッジを1個10秒で3個30秒で破碎して、エアシャワー室(70)に落下せしめ、スライドゲート(71)(72)を閉めて30秒間送風し、トナー等を分離し、スライドゲート(71)(72)を開けて、破碎物を排出、プラスチック材料と金属材料を分別回収するという破碎、送風トナー捕集、排出の1分サイクルで行なうものである。なお、廃複写機用トナーカートリッジの形態により、処理サイクルは、周速を任意に設定して調整することができる。

【0027】

【発明の効果】以上、詳細且つ具体的な説明より明らかなように、本発明の使用済トナーカートリッジの破碎装置は、破碎効率を格段に高め、安全で、環境に優しいという優れた効果を奏するものである。また、粗破碎手段及び2次破碎手段双方の駆動及び停止を任意に選択することができ、また回転速度、駆動力、回転方向を制御することができ、粗破碎手段及び2次破碎手段におけるそれぞれの破碎ピンは、容易に交換することができ、その植設密度、及び植設高さ(即ち対向回転する相手側ローラとの間の間隙)を容易に変えることができるという極めて融通性に優れたものである。

【図面の簡単な説明】

【図1】本発明の使用済トナー容器の破碎装置の1例を

説明するための側面図である。

【図2】本発明の装置の立面断面図である。

【図3】本発明の装置の一部切欠き断面図である。

【図4】本発明の装置における粗破碎手段の平面断面図である。

【図5】本発明の装置における2次破碎手段の平面断面図である。

【図6】本発明の装置における粗破碎手段の粗破碎ピン植設状態を説明する図である。

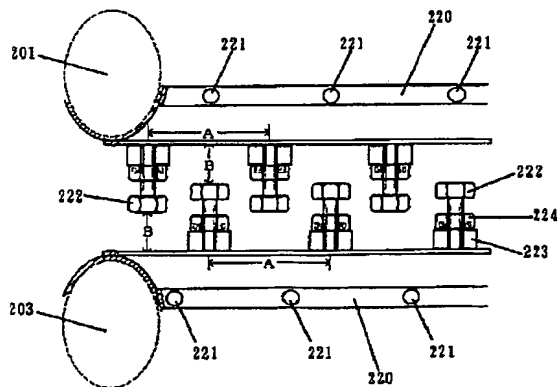
【図7】本発明の装置における2次破碎手段の2次破碎ピン植設状態を説明する図である。

【図8】本発明の装置におけるエアシャワー室を模型的に示した斜視図である。

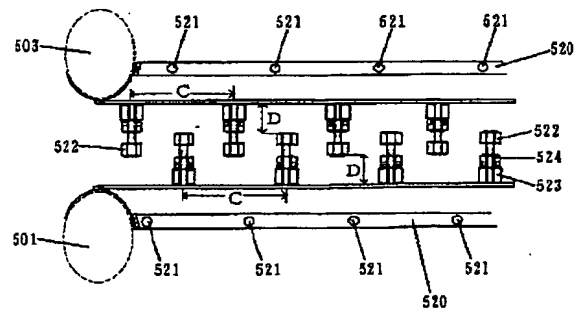
【符号の説明】

- | | | | |
|-----|--------------|-----|-------------|
| 1 | ハウジング | 205 | 円盤状部材 |
| 11 | 使用済トナー容器の挿入口 | 208 | 裁頭円錐形フランジ部材 |
| 12 | 破碎部 | 209 | 軸受 |
| 13 | 原動機 | 220 | 帯状補強部材 |
| 15 | 原動機 | 221 | 粗破碎ピン植設孔 |
| 20 | 粗破碎手段 | 222 | 粗破碎ピン |
| 50 | 2次破碎手段 | 223 | 粗破碎ピン螺合部材 |
| 60 | 破砕片排出路 | 224 | ピン高固定ナット |
| 70 | エアシャワー室 | 501 | ローラ状部材 |
| 71 | 上部スライドゲート | 502 | 回転軸 |
| 72 | 下部スライドゲート | 503 | ローラ状部材 |
| 80 | 破砕片排出口 | 504 | 回転軸 |
| 131 | 動力伝達手段 | 505 | 円盤状部材 |
| 132 | 駆動歯車 | 511 | 動力伝達手段 |
| 133 | 歯車 | 512 | 駆動歯車 |
| 134 | 歯車 | 513 | 安全カバー |
| 135 | 安全カバー | 520 | 帯状補強部材 |
| 201 | ローラ状部材 | 521 | 2次破碎ピン植設孔 |
| 202 | 回転軸 | 522 | 2次破碎ピン |
| 203 | ローラ状部材 | 523 | 2次破碎ピン螺合部材 |
| 204 | 回転軸 | 524 | ピン高固定ナット |
| | | 533 | 歯車 |
| | | 534 | 歯車 |
| | | 701 | 送風路 |
| | | 702 | 排風路 |
| | | 703 | 空気吹込口 |
| | | 704 | 空気吸引口 |
| | | 707 | 格子 |
| | | 708 | 上部口 |
| | | 709 | 下部口 |
| | | A | 粗破碎ピン植設間隙 |
| | | B | 粗破碎間隙 |
| | | C | 2次破碎ピン植設間隙 |
| | | D | 2次破碎間隙 |

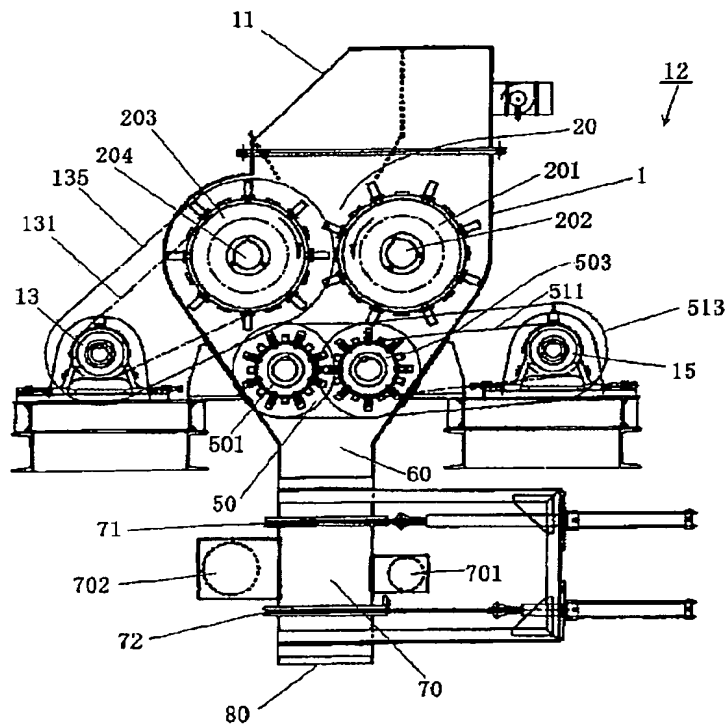
【図6】



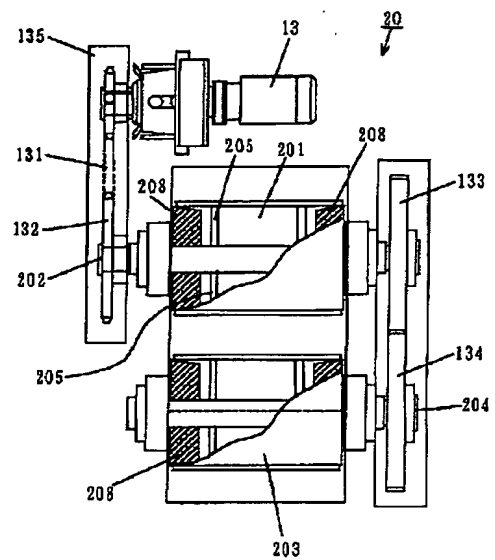
【図7】



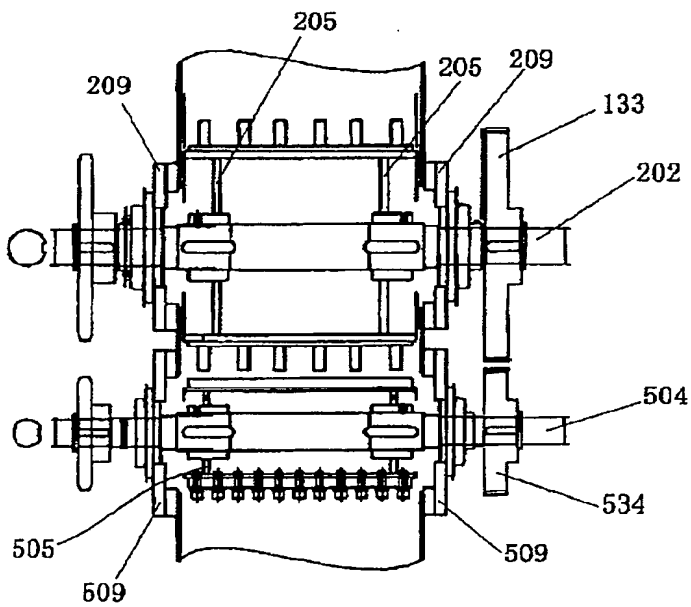
【図1】



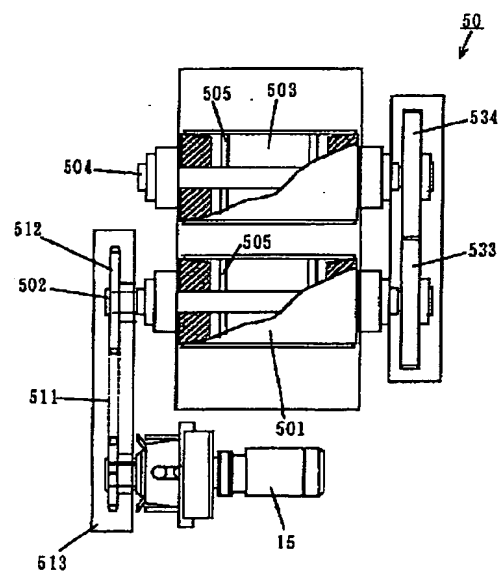
【図4】



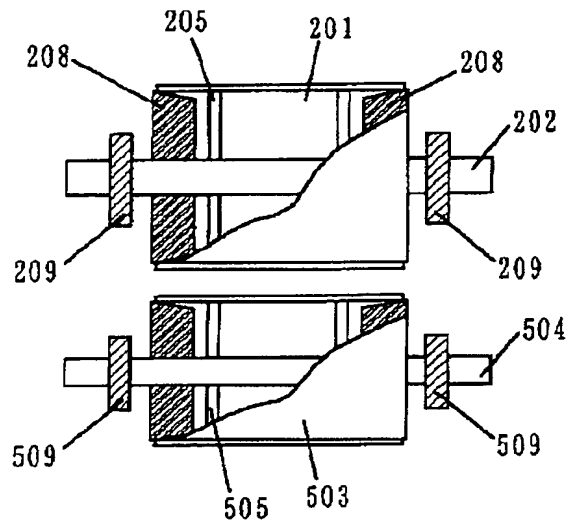
【図2】



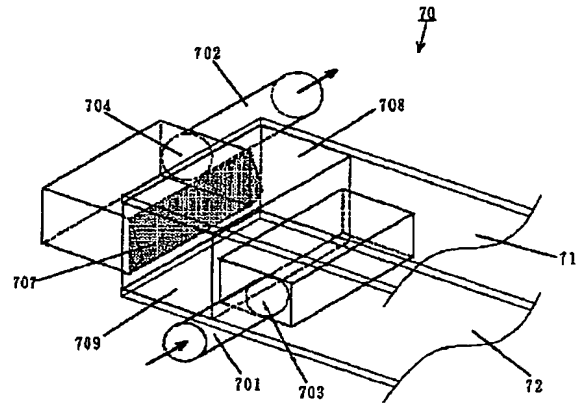
【図5】



【図3】



【図8】



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